



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/019,615	05/28/2002	Ravi Chandran	2376.2115-004	7963
57690 7590 12/07/2009 HAMILTON, BROOK, SMITH & REYNOLDS, P.C. 530 VIRGINIA ROAD P.O. BOX 9133 CONCORD, MA 01742-9133				
EXAMINER WOZNIAK, JAMES S				
ART UNIT		PAPER NUMBER		
2626				
MAIL DATE		DELIVERY MODE		
12/07/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/019,615

Applicant(s)

CHANDRAN ET AL.

Examiner

JAMES S. WOZNIAK

Art Unit

2626

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 8/5/2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 13, 15-20, 22-26, 28-38, 44, 46-51, 53-61 and 64-73 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 13, 15-20, 22-26, 28-38, 44, 46-51, 53-61 and 64-73 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 February 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-846)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. In response to the office action from 2/2/2009, the applicant has submitted an amendment, filed 8/5/2009, amending independent claims 1, 26, 32, and 57, while adding claims 64-73, canceling claims 8-12, 14, 21, 29, 39-43, 45, 52, and 62-63 and arguing to traverse the art rejection based on the limitation regarding the echo likelihood estimation module (*Amendment, Pages 17-18*). The applicant's arguments have been fully considered but are not convincing for the reasons set forth below.

2. In response to the previous 35 U.S.C. 101 rejection, the applicant argues that claims 32 and 57 are amended to be tied to a communication system (*Amendment, Page 16*). In response, the examiner notes that this "tied to" instance is based on the claim limitation dealing with "transmitting" the echo reduced signal which inherently involves hardware and eliminates the claimed method from being performed by a human. As such the previous 35 U.S.C. 101 rejection has been withdrawn.

Claim Objections

3. **Claims 1-7, 13, 15-20, 22-25, and 64-67** are objected to because of the following informalities:

In **claim 1**, "near-end signal and and power of past values" should be changed to --near-end signal and power of past values-- for grammatical correctness.

Claims 3, 19, 66, and 67 recite various steps/elements "arranged to" perform certain functions. It is not certain whether these functions are part of the claim because they are not positively recited only "arranged to" perform them. These functions will be considered as being actively performed for the application of the prior art of record.

The further dependent claims fail to overcome the objections directed toward their associated parent claims, and thus, are also objected to by virtue of their dependency.

Appropriate correction is required.

Response to Arguments

4. Applicant's arguments have been fully considered but they are not persuasive for the following reasons:

With respect to **Claim 1**, the applicant argues that Rabipour et al (*U.S. Patent: 6,011,846*) fails to teach the claimed "echo likelihood estimation module" because it is alleged that Rabipour merely employs a ratio of far-end and near-end energies to determine the most effective echo suppression treatment, which is clearly different from the applicant's "likelihood of an echo signal in a partially decoded near-end signal" (Amendment, Pages 17-18). In summary, the applicant's position is that Rabipour's calculation is based upon determining, with certainty, the most effective echo treatment while the applicant's invention is concerned with determining the likelihood of an echo.

In response, the examiner notes that the current broad claim scope is anticipated by the teachings of Rabipour. Current claim 1 does not specify how an echo likelihood is calculated- the specific equation used and all of the variables involved. Instead claim 1 broadly determines calculating this likelihood as a function of the claimed ratio. In other words the present claim scope sets forth that echo likelihood is the result of the calculated ratio. Rabipour teaches this ratio and even further notes that this calculation is associated with an echo certainty (*i.e.*, *likelihood*, Col. 5, Lines 45-64). More specifically, Rabipour obtains a near-end speech signal by first partially decoding it without performing full decoder processing (Col. 3, Lines 1-10). Rabipour also buffers a far-end signal in preparation for his calculation in a memory (Col. 3, Lines 65-67; and Fig. 1, Element 120). Rabipour then calculates a degree of echo "certainty" or likelihood relying on a function of a ratio of spectral energy or power of near and far end signals (Col. 4, Lines 7-22; and Col. 5, Lines 45-64). It is this determined certainty from the ERL that anticipates the applicant's claimed "echo likelihood". Thus, these arguments have been fully considered, but are not convincing. The applicant has also amended to claim 1 to indicate subframe based processing. Chen (*U.S. Patent: 5,651,091*) was previously relied upon to provide this teaching and the art rejection of the independent claims have been altered to include Chen, responsive to the amended claims.

The art rejections of the remaining dependent and independent claims are traversed for reasons similar to claim 1 (*Amendment, Pages 18-21*). In regards to such arguments, see the response directed to claim 1.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1-4, 7, 15-16, 18-20, 22-25, 32-35, 38, 46-47, 49-51, 53-56, and 64-73** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rabipour et al (*U.S. Patent: 6,011,846*) in view of Chen (*U.S. Patent: 5,651,091*).

With respect to **Claims 1 and 32**, Rabipour discloses:

An echo likelihood estimation module to generate an echo likelihood estimate representative of a likelihood of an echo signal in a partially decoded near-end signal (*extracting speech parameters from near-end encoded speech signals without performing full decompression, Col. 3, Lines 1-10; and Col. 3, Line 48- Col. 4, Line 22*) as a function of a ratio of a power of a present subframe of the near-end signal and power of past values of far-end subframes in a buffer (*echo degree presence certainty determination involving a ratio of spectral energies, Col. 4, Lines 8-22; Col. 5, Line 35- Col. 6, Line 16; and far end signal buffering, Col. 3, Lines 55-67; and Fig. 1, Element 120*);

An echo reduction module to reduce echo in the near-end signal as a function of replacing at least a first parameter with an adjusted first parameter in the near end digital signal, responsive to the echo likelihood estimate (*means for replacing received speech parameters with*

echo adjusted near end speech parameters in response to a detected echo, Col. 5, Line 35- Col. 6, Line 16); and

A transmitter to transmit the near end digital signal with reduced echo (*performing echo suppression in a telecommunication network that would inherently require some type of transmitter to send echo adjusted speech to a caller, Col. 3, Lines 1-10 and 33-43; and Fig. 1).*

Although Rabipour teaches the claimed system for coded domain echo cancellation, Rabipour does not explicitly teach subframe-based processing. Chen, however, evidences that such processing is well known in the art (*Col. 5, Lines 5-8).*

Rabipour and Chen are analogous art because they are from a similar field of endeavor in speech coding applicable to echo cancellation. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Rabipour with the subframe processing taught by Chen in order to provide a convenient and standard coding processing that imposes lesser demands upon echo suppressors (*Chen, Col. 1, Lines 38-48; and Col. 4, Lines 58-61).*

With respect to **Claims 2 and 33**, Rabipour discloses:

The adjustment module generates the adjusted first parameter as a function of quantizing the adjusted first parameter (*replacing quantized speech parameters, Col. 6, Line 40- Col. 7, Line 32).*

With respect to **Claims 3 and 34**, Rabipour discloses:

The echo likelihood estimation module is arranged to generate the echo likelihood estimate as a function of an amount echo present in the partially decoded near-end signal (*Echo compensation adaptive to an echo presence certainty, Col. 5, Line 35- Col. 6, Line 16).*

With respect to **Claims 4 and 35**, Rabipour recites:

The first parameter of the plurality of parameters includes at least one of a representation of filter coefficients, a codebook gain, codebook vector parameter, pitch period parameter, or pitch gain parameter (*LPC coefficient frames, Col. 3, Lines 48-54*).

With respect to **Claims 7 and 38**, Rabipour recites:

The magnitude frequency response corresponds to background noise (*correction factor determined using an impulse response for updated LPC parameters corresponding to background noise, Col. 7, Lines 11-62*).

With respect to **Claim 15**, Rabipour discloses LPC coefficients including excitation parameters (*Col. 6, Lines 20-31*).

With respect to **Claims 16 and 47**, Rabipour discloses partial decoding for extracting speech parameters, which avoids synthesis processing (*Col. 1, Line 52- Col. 3, Line 10*).

With respect to **Claim 18**, Rabipour discloses:

The at least one decoding step includes post filtering (*synthesis processing of a coded speech signal that would inherently include filtering, Col. 1, Line 52- Col. 3, Line 10*).

With respect to **Claims 19 and 50**, Rabipour discloses the use of LPC-based speech compression and transmission (*Col. 1, Lines 48-51; and Col. 3, Lines 1-10*).

With respect to **Claims 20 and 51**, Rabipour further discloses the use of an LPC-based compression code (*Col. 3, Lines 48-54*).

With respect to **Claims 22 and 53**, Rabipour discloses averaging a set of near and far end LPC parameters to determine a degree of echo compensation (*Col. 3, Line 48- Col. 4, Line 22*).

With respect to **Claims 24 and 55**, Rabipour teaches completing echo suppression for a frame before advancing to a next frame as shown in Figs. 2C and 3, while Chen discloses the subframe based processing as applied to Claim 23.

With respect to **Claim 46**, Rabipour further discloses LPC coefficients including excitation parameters (*Col. 6, Lines 20-31*).

With respect to **Claim 49**, Rabipour further discloses:

The at least one decoding step comprises post filtering (*synthesis processing of a coded speech signal that would inherently include filtering, Col. 1, Line 52- Col. 3, Line 10*).

With respect to **Claims 23 and 54**, Rabipour further discloses:

Transmitting the far-end and near-end signals using a compression code, the compression code included in frames of the near-end and far-end signals, the frames including the first parameter (*LPC encoding where each encoded frame includes the LPC coefficients, Col. 3, Lines 1-10; Col. 3, Lines 48-54*), wherein Chen teaches the subframe based processing as applied to claim 1.

With respect to **Claims 25 and 56**, Rabipour teaches the frame-based echo suppression system and method that adjusts speech parameters for each speech frame according to a detected echo, as applied to Claim 1 and further note that the adjusted parameters are based on past frames (*Col. 6, Lines 1-59*), while Chen recites subframe-based processing (*Col. 5, Lines 5-8*).

With respect to **Claims 64 and 68**, Rabipour further discloses

A decoder module to at least partially decode the near-end and far-end signals and generate a partially decoded near-end signal and a partially decoded far-end signal (*echo*

cancellation applied mid network and parameter extraction, Col. 3, Lines 1-10 and Col. 3, Lines 55-67).

With respect to **Claims 65 and 69**, Rabipour discloses LPC coefficients that model spectral shape of human speech (*Col. 3, Lines 48-54*).

With respect to **Claim 66**, Rabipour further discloses

The echo reduction module is arranged to adjust the representation of filter coefficients towards a magnitude frequency response (*modifying LPC coefficients based on a modified impulse response, Col. 6, Line 20- Col. 7, Line 32*).

Claims 67 and 71 contain subject matter similar in scope to claim 1, and thus, is rejected under similar rationale.

Claim 70 is similar in scope to claim 66, and thus, is rejected under similar rationale.

Claim 72 is similar in scope to claim 1, and thus, is rejected under similar rationale.

Claim 73 is similar in scope to claim 32, and thus, is rejected under similar rationale.

7. **Claims 5-6, 13, 37, and 44** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rabipour et al in view of Chen et al and further in view of Strawczynski et al (*U.S. Patent: 6,138,022*).

With respect to **Claims 5, 36, and 44**, Rabipour in view of Chen discloses the echo suppression system and method utilizing LPC coefficients, as applied to Claims 1 and 4. Rabipour does not teach the use of line spectral frequencies (*LSFs*), however Strawczynski teaches the use of such LSF coefficients (*Col. 3, Lines 24-34*).

Rabipour, Chen, and Strawczynski are analogous art because they are from a similar field of endeavor in speech coding applicable to echo cancellation. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Rabipour in view of Chen with the LSF coefficients taught by Strawczynski in order to provide speech coefficients that uniquely define a human articulatory tract, which are suited to a number of different applications (*Strawczynski, Col. 3, Lines 24-34*).

With respect to **Claims 6, 13, and 37**, Strawczynski additionally recites the use of log area ratio coefficients (*Col. 3, Lines 24-34*).

8. **Claims 17 and 48** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rabipour et al in view of Chen and further in view of Christensson et al (*U.S. Patent: 6,510,224*).

With respect to **Claim 17**, Rabipour in view of Chen discloses the echo suppression system and method utilizing spectrum coefficients and partial decoding, as applied to Claims 1 and 16. Rabipour does not specifically suggest the use of power parameters, however Christensson teaches the use of such parameters (*Col. 6, Line 40- Col. 7, Line 8*).

Rabipour, Chen, and Christensson are analogous art because they are from a similar field of endeavor in speech coding applicable to echo cancellation. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Rabipour in view of Chen with the use of power parameters in echo suppression as taught by Christensson in order to achieve improved echo suppression performance based on a power parameter and focused on frequency bands where an echo component could easily be mistaken

for near end speech (*Christensson, Col. 7, Lines 1-8*).

Claim 48 contains subject matter similar to claim 17, and thus, is rejected under similar rationale.

9. **Claims 26, 28-31, and 57-61** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rabipour et al in view of the Applicants' Admitted Prior Art (*AAPA*).

With respect to **Claims 26 and 57**, Rabipour discloses:

An echo likelihood estimation module to generate an echo likelihood estimate representative of a likelihood of an echo signal in a partially decoded near-end signal (*extracting speech parameters from near-end encoded speech signals without performing full decompression, Col. 3, Lines 1-10; and Col. 3, Line 48- Col. 4, Line 22*) as a function of a ratio of a power of a present subframe of the near-end signal and power of past values of far-end subframes in a buffer (*echo degree presence certainty determination involving a ratio of spectral energies, Col. 4, Lines 8-22; Col. 5, Line 35- Col. 6, Line 16; and far end signal buffering, Col. 3, Lines 55-67; and Fig. 1, Element 120*);

An adjustment module to adjust the bits (*LPC compressed speech data bit stream adjusted based on near and far end speech data, Col. 3, Lines 1-10; Col. 3, Line 48- Col. 4, Line 22; Col. 5, Line 35- Col. 7, Line 32*); and

A transmitter to transmit the bits in an adjusted state to a far end device to present the first and second bits in an audible form to a user (*performing echo suppression in a telecommunication network that would inherently require some type of transmitter to send echo adjusted speech to a caller, Col. 3, Lines 1-10 and 33-43; and Fig. 1*).

Although Rabipour discloses adjusting bits directed to LPC compression code, Rabipour does not specifically suggest the combination of a compression code and a linear code to express a speech signal, such a coding scheme, however, is well known in the prior art as is evidenced by the AAPA. The AAPA recites a TFO GSM standard using a combination of coded speech and PCM bits (*Page 2, Line 11- Page 3, Line 11; and Fig. 3*).

Rabipour and the AAPA are analogous art because they are from a similar field of endeavor in speech compression. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Rabipour with the TFO GSM standard recited in the AAPA in order to expand Rabipour's echo cancellation for use in well-known cellular networks (*AAPA, Page 2, Lines 17-19*).

With respect to **Claims 28 and 58**, the AAPA further recites the use of PCM code (*Page 2, Line 7- Page 3, Line 11*).

With respect to **Claims 29 and 59**, the AAPA recites the TFO GSM standard as applied to Claims 26 and 57.

With respect to **Claims 30 and 60**, the AAPA further recites first bits comprising the two LSBs and second bits comprising 6 MSBs (*Page 3, Lines 3-11; and Fig. 3*).

With respect to **Claims 31 and 61**, the AAPA further recites the use of PCM code for the 6 MSBs (*Page 2, Line 7- Page 3, Line 11; and Fig. 3*).

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: See PTO-892.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632. The examiner can normally be reached on M-Th, 7:30-5:00, F, 7:30-4, Off Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached at (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/James S. Wozniak/
Primary Examiner, Art Unit 2626